

Dr. Nordenskjöld concludes that there is no proof that the Norwegian ice extended to the British coast, and an alternative explanation that the North Sea was filled with such heavy pack-ice as to press back the glaciers which flowed from the English mountains he rejects as "extraordinarily improbable" from all the evidence given by Arctic and Antarctic ice. He makes the interesting suggestion that the shallow areas of the North Sea were filled with barrier-ice formed *in situ*, like that of the Ross Sea, and that its obstruction was the cause of the deflection of the British glaciers.

J. W. G.

#### STRUCTURE AND CARE OF TEETH.

*Our Teeth. How Built Up; How Destroyed; How Preserved.* By R. Denison Pedley and Frank Harrison. Pp. 99. (London: Blackie and Son, Ltd.) Price 5s. net.

THE authors of this little book are well known to the members of the dental profession, but as the work is obviously intended for the lay public it may be as well to state at once that both Mr. Pedley and Mr. Frank Harrison occupy a high position in dental surgery; indeed, the fact that Mr. Harrison was chosen as president of the Odontological Section of the British Medical Association and Mr. Pedley as one of the vice-presidents in 1908 sufficiently demonstrates their title to advise and instruct the general public upon things dental. The book opens with a discussion of dental anatomy and physiology, illustrated with diagrams and photomicrographs of remarkable excellence. The authors have not hesitated to employ quite high powers, even such a magnification as  $\times 2250$ ; into the actual photomicrograph they have introduced explanatory labels with lines pointing to the special objects to which it is desired to direct attention.

Obviously in a work of this kind an abstruse dissertation upon tooth-development would be out of place; the authors plump for a theory and instal it as correct. Thus on p. 30 there occur illustrations and letterpress which would lead the reader to believe that the process of enamel calcification was quite understood, and that the process in the case of dentine was universally acknowledged to consist of the conversion of the odontoblast, whereas the former is very far from settled and the latter is supposed by some of the best living authorities to be a matrix calcification not involving the cells at all; however, the process as described in the book has the sanction of very good observers in the past, and it is no drawback for a writer on a technical subject addressing a lay audience to be dogmatic.

The pictures and description of dental caries and its pathology are both excellent; the valuable work done by Dr. Miller, of Berlin, is duly recognised, but the pioneer work of Milles and Underwood in 1881 (two years before Miller's first essay) is not noticed, which seems an omission. In the 100 pp. the authors run over structure, development, nourishment, growth, disease, allied disease, and treatment, so that the gift

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of condensation has been required to no small extent. The style throughout is lucid and interesting, the illustrations quite remarkably good and well reproduced, and if the opinions of the authors, or the authorities upon whom they rely, are stated occasionally as *ex cathedra* and unquestionable, such treatment of scientific questions is very difficult to avoid in a work addressed to a popular audience. The authors are to be congratulated upon having produced a thoroughly clear and useful manual, and on having left no doubt possible in the reader's mind as to their own views.

#### OUR BOOK SHELF.

*The Funeral Papyrus of Ioniya.* (Theodore M. Davies' Excavation: Bibân el Molûk.) With Introduction by Edouard Naville. Pp. viii+20; plates 34. (London: Archibald Constable and Co., Ltd.) Price 21s. net.

AMONG the objects discovered by the American explorer, Mr. Theodore M. Davies, in the tomb of Queen Thiy's parents in the Bibân el Mûlûk at Thebes was the funeral papyrus of Ioniya, the father of Amenophis III.'s great Queen. This was first worked over by Prof. Newberry in 1906, who published a summary of its contents in Mr. Davies' "The Tomb of Ioniya and Tuiyou" (Constable and Co.) in 1907. Photographs of the document were then placed in Prof. Naville's hands for fuller publication, and the volume now before us is the Swiss Egyptologist's account of this important eighteenth-dynasty copy of the Book of the Dead. The papyrus itself measures 9 metres 70 cm. long; it is written in linear hieroglyphs with vignettes finely executed in colour, and contains some forty chapters, one of which is new to science. This new chapter is illustrated by a vignette of nine serpents, and is entitled "Coming out of the Day." It belongs to the group of chapters of the gates and pylons where the deceased has to show his knowledge of the names of the occupants and warders. To the finely reproduced facsimiles of the document M. Naville has added a translation, based mainly on that of the standard edition of the Book of the Dead by the late Mr. Le Page Renaud—the edition which Mr. Naville himself completed and edited.

*Helmholtz. Eine Zeitschrift für die exakten Wissenschaften mit besonderer Berücksichtigung ihrer Anwendungen.* Herausgegeben von Dr. Th. v. Simson. Bd. i., No. i. (Helmholtz-Verlag: Neustadt an der Haardt, April, 1910.) Price 16 marks per volume.

ANOTHER scientific journal! It must be confessed that the necessity for the existence of this journal is not at all evident. There is no particular reason, so far as the reviewer can see, why the contents of this number could not have found a place in many other quarters.

The *pièce de résistance* is the article by Arrhenius on "The Laws of Digestion and Resorption." This consists in a "quantification" of the experimental work of E. S. London in St. Petersburg, and is decidedly interesting. After this comes a series of portentously solemn "scientific aphorisms" by C. H. Walter, which the reviewer has been quite unable to digest. There is an article by F. Fittica on "The Transmutation of the so-called Elements," in which this author tells us again how he transmuted phosphorus into arsenic (by heating it with ammonium

nitrate), &c. To borrow the language of a sister science, there exists a slight doubt as to the veridical nature of these phenomena. However, an editorial footnote commends them to the reader's notice.

In an interesting article, H. Lunden gives a description (with sketch-plans) of Arrhenius' new Nobel Institute laboratory at Stockholm. Several other short articles deal with such varied topics as sun-spots and magnetic storms, precautions against coal-dust explosions in mines, &c. Enough has been said to indicate the catholicity of the editor's views concerning the scope of his new journal.

*List of Documents in Spanish Archives relating to the History of the United States, which have been printed or of which Transcripts are preserved in American Libraries.* By J. A. Robertson. Pp. xv+368. (Washington, D.C.: Carnegie Institution of Washington, 1910.)

THIS publication of the Carnegie Institution is the most recent of the "papers" of the Department of Historical Research of the Institution at Washington. The editor of the series points out in a preface that the volume may be regarded as an accompaniment to Prof. W. R. Shepherd's "Guide to the Materials for the History of the United States in Spanish Archives."

The two lists contained in the present book concern the history of the territory included within the boundaries of the continental United States of to-day. All matter touching that territory only indirectly or by inference as a part of the Indies has been rejected. The first list consists of published material, the original manuscripts of which exist in Spanish archives, or which, with good reason, are conjectured to exist in Spain; the second is much the longer, and is a list of transcripts in libraries and archives in the United States from originals in Spanish archives.

*Lightning and the Churches.* By Alfred Hands. Second edition. Pp. 92. (London: J. W. Gray and Son, 1910.) Price 1s. net.

THE first edition of this interesting pamphlet was dealt with in a note in our issue of April 22, 1909 (vol. lxxx., p. 228), and we welcome this second edition as indicating that increased attention is being directed to the important matter of protecting buildings from damage by lightning. Mr. Hands, who has expert knowledge of the subject, says that investigation shows that about twenty churches are struck and damaged in Great Britain every year. In some years the number is much greater; in 1907, for instance, thirty-nine suffered from this cause, and in 1908 there were thirty-one. Architects and others, whose business makes them responsible for the protection of buildings against lightning, would do well to study this little work.

*The British Isles in Pictures. A Geographical Reading Book.* By H. Clive Barnard. Pp. 64, containing 58 illustrations. (London: A. and C. Black, 1910.) Price 1s. 6d.

THERE are thirty-two beautiful coloured pictures in this volume, which will delight young pupils of geography, and serve also to explain graphically to them the characteristics of many kinds of scenery found in their native land. The black and white illustrations will also help to secure and maintain the interest of a class. The letterpress provides useful information; and, though it is hardly suitable for a text-book, it will serve admirably to supplement the geography lesson proper. The cheapness of the volume should ensure it a wide popularity.

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## LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

### The Temperature Coefficients of the Ferromagnetic Metals.

EXPERIMENTS on the temperature coefficients of magnets published some years ago (Roy. Soc. Phil. Trans., vol. ccciii., 1903) showed that the magnitude of the coefficient is largely dependent on the dimension ratio of the magnet, but that when the dimension ratio is sufficiently increased to make the self-demagnetising factor negligible, the coefficient is then characteristic of the ferromagnetic material. Observations made at that time, but not published, on iron, nickel, and cobalt magnets heated up to 100° C. showed that the coefficient was large in nickel, less in iron, and least in cobalt, the order being the inverse of the order of the magnetic critical temperatures of these metals.

I have recently repeated these experiments, carrying the temperature to 300°–400° C., and within this range it appears that when the magnetic intensity in the cyclic state is plotted against a scale, in which temperatures are calculated as percentages of the critical temperatures, then the points lie very nearly on one curve. In short, if corresponding temperatures are chosen, the temperature coefficient is the same for iron and nickel, and probably for cobalt. (The details of the experiments I omit here, but I should say that the cobalt employed was not pure, and behaved irregularly at 300° C.)

For example, the temperature coefficient of nickel between 15° and 115° C. is 0.0005, and it is the same for iron between 250° and 430° C., the corresponding temperatures; the temperature coefficient of iron between 7° and 107° C. is 0.0002, and it is nearly the same for cobalt between 90° and 220°, the corresponding temperatures.

Curie has shown that when iron is heated it passes continuously through the critical temperature from the ferromagnetic to the paramagnetic condition (in the latter state obeying the gas laws *mutatis mutandis*), and that the curves which trace the change from one state to the other are the counterpart of the curves which trace the passage of a liquid to a gas. An equation to the fluid curves may therefore be applied to the magnetic curves, and van der Waals's equation may be appropriately used, since it takes account of the facts that there is mutual attraction of the molecules and that there is a limit to fluid density, facts which have their counterpart in ferromagnetism in the mutual attraction of the molecular magnets and in the limit to magnetic intensity. One of the conclusions drawn from van der Waals's equation and the theory of corresponding states is that the coefficient of density, or expansion, of all liquids at corresponding temperatures is the same, and by similar reasoning this law is deducible for magnets. This is, in fact, the law to which the experiments cited above lead.

It is also worthy of notice that the temperature coefficient of density of liquids is of the same order as the temperature coefficient of intensity of ferromagnetics, just as the temperature coefficient of density of gases is of the same order as the temperature coefficient of intensity of paramagnetics.

Within the limits of this letter it is not possible to discuss these facts, but they show that certain magnetic problems may be treated by an application of van der Waals's equation with results consistent with experiment.

Manchester.

J. R. ASHWORTH.

### The Ratio between Uranium and Radium in Minerals.

DR. BOLTWOOD established the constancy of this ratio for all the minerals he examined (*Phil. Mag.*, April, 1905). He examined, however, no mineral in which uranium was present as phosphate, nor did he examine the then newly discovered mineral thorianite. Later, Mdlle. Gleditsch (*Comptes rendus*, cxlviii., 1451; cxlix., 267) found that the ratio radium to uranium was about